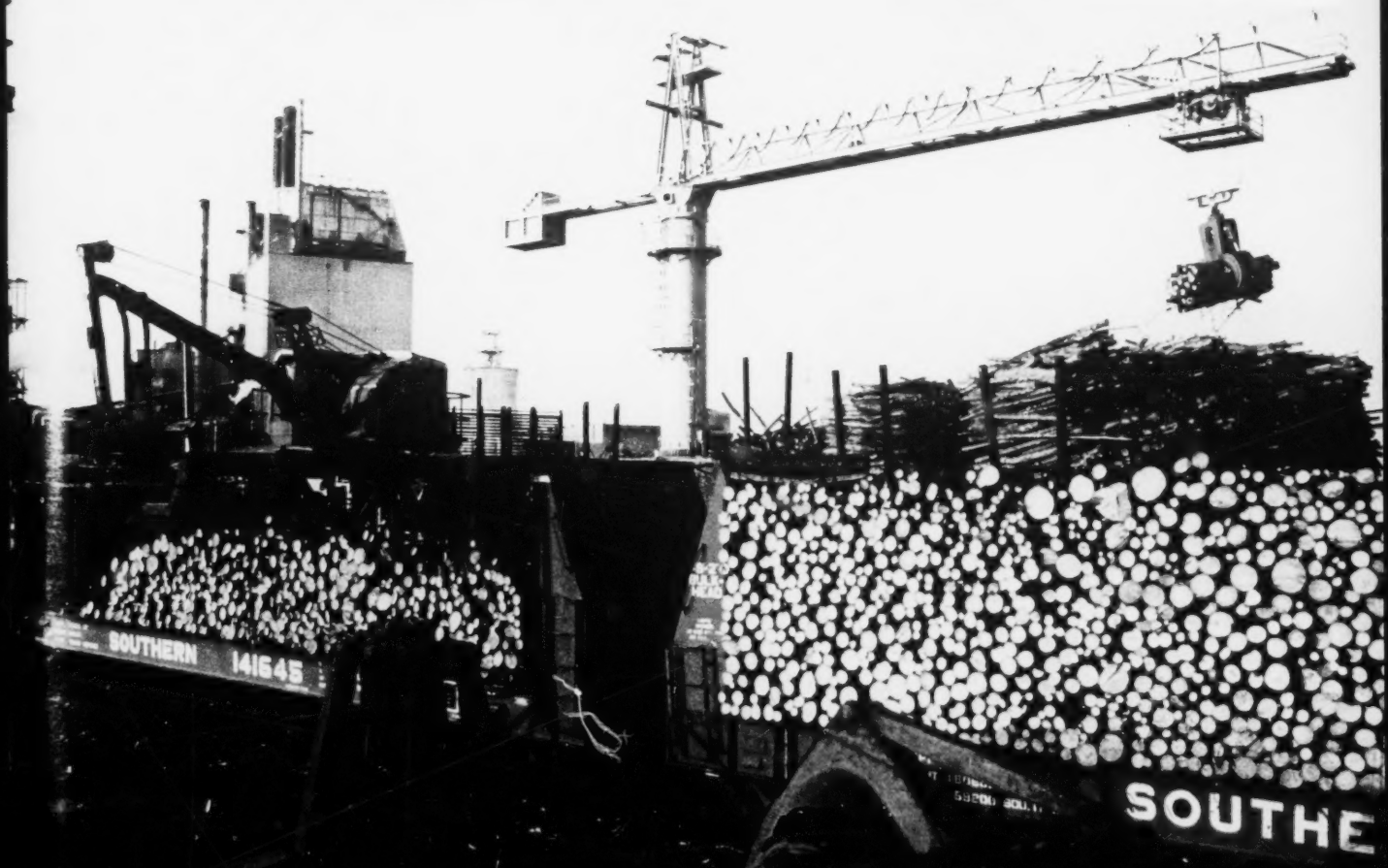
PULP & PAPER

July 1984



PULPWOOD PROCESSING:
Chipping away at woodyard costs

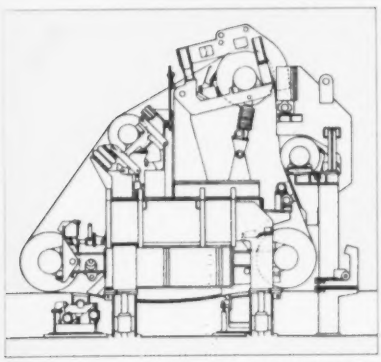
Streamlined bleach plant at Swedish mill 136

The top-wire unit: a former for all seasons 114

PULP&PAPER

Volume 58 Number 7 July 1984

AUGUSTA NEWSPRINT WOODYARD **119**



TOP WIRE FORMERS **114**

COVER: *The modern, efficient woodyard as typified by Chesapeake's West Point, Va., mill is examined in this issue's special focus on pulpwood processing. (Photo courtesy of Chesapeake Corp.)*

ISSUE FOCUS: Pulpwood Processing

54 **Chip quality has a major impact** on kraft pulp mill yield, operating efficiency, cost-effectiveness, and final product quality

76 **Chip thickness screening** and overthick chip treatment: no critical chip thickness standard is applicabie to all kraft pulp mills

98 **Owens-Illinois improves productivity** and efficiency at its Valdosta woodyard with new pulpwood handling equipment, video monitoring system

112 **Single-rod dischargers** have many wood handling applications; new design eliminates many previous maintenance, operating problems

119 **Augusta Newsprint's 1,680-cord/day woodyard** is key part of recent newsprint expansion, providing chips and pulpwood from treelength logs

133 **Pulpwood slashing is a dead-cost operation** for most mills; treelength processing can be an advantageous alternative

Mill operations

59 **Directly connected pulp screening systems** are efficiently controlled with relatively modest instrumentation requirements

79 **New vacuum system at G-P mill** ups sheet dryness out of press section, improves paper machine runability and efficiency

114 **Top wire formers:** review of applications, operations for three available units designed to meet a broad range of special needs

111 **Boise Cascade uses wastewater screen** at its Kenora, Ont., newsprint mill for profitable fiber recovery from mill effluent

136 **Length of bleaching line cut from three to five stages** at Swedish mill via use of O_2-reinforced caustic extraction stage

Process Automation

91 **Online pitch monitor** uses simple box with removable stainless steel plates; proper placement in process stream is critical

93 **Global energy management system** at Wilh. Schauman mill in Finland optimizes steam production and utilization, minimizes purchased power use

Engineering/Maintenance

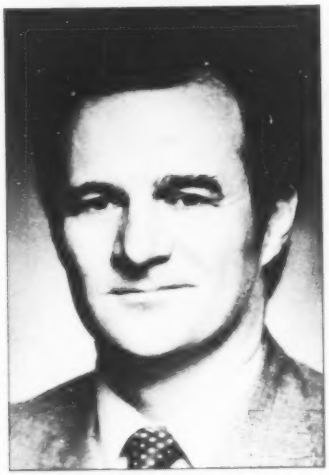
72 **Nonasbestos gaskets, seals** are being used increasingly in pulp and paper mills for high-pressure/temperature services

134 **Oil reclamation system at Louisiana-Pacific mill** cuts machine lubrication costs, improves general cleanliness of operations

Management

62 **Pacific Rim forecast as fastest-growing market** in 1980s; North American pulp and paper mills should reap benefits

FASTEST SACKER IN API PACK-OFF **31**



HUFFT COMMENTS **220**

News

9 **Month in Statistics**—U.S. paper and paperboard production

11 **Marketing Roundup**—European pulp prices unchanged; offset hike gains acceptance; LWC price increases are spreading

13 **Grade Profile**—Recycled paperboard: clay-coated demand lags

23 **News Roundup**—**Labor:** Abitibi likely to set pattern in East; Pacific Northwest talks stall

25 **Acquisitions/Mergers:** Goldsmith makes offer to Continental; Lydall to sell boxboard division; Smurfit buys 9% stake in SFI

29 **Finance:** Canada has mixed first-quarter results

Expansions: Consolidated gets first twin wire

39 **International News:** Dutch mill considers LWC project; new machines planned in Sweden; Finnish modernizations scheduled

41 **Regulatory Roundup:** Scott strikes deal with utility; licensees should have preference; import bill worries forest industry

Columns

7 **Editors' Notebook**—Cutting costs in the woodyard; engineer profile

43 **Washington Viewpoint**—Uncle Sam wants you

153 **Career Development**—Planning: not only for the ivory tower

165 **Engineer to Engineer**—Survey examines the typical engineer

205 **Chemical Markets**—Sodium hydrosulfite markets show modest recovery

220 **Industry Comment**—Investors favor industry for wrong reasons

Departments

45 **Conference Calendar**

155 **News of People**

175 **Product Showcase**

177 **New Products**

191 **Product Review**

193 **Current Literature**

201 **Book Shelf**

203 **Finishing/Converting**

205 **Chemical Markets**

206 **Supplier News**

Services

169 **Reader Service Index**

171 **Reader Service Card**

209 **Jobs Wanted**

210 **Professional Service Directory**

212 **Classified Advertising**

218 **Advertisers Index**

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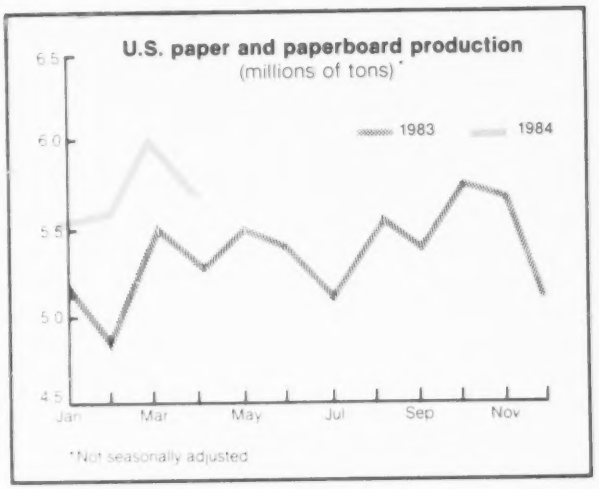
U.S. paper and paperboard demand in April continued at the record high pace evident since last October. Total tonnage in the January-April period was up 10% over the same period in 1983, according to the American Paper Institute. The March-April moving average of seasonally adjusted data was at the rate of 67.8 million tpy, very close to the 68.3-million-tpy rate for the January-April period.

Among the major grades, printing and writing papers continued to show important gains with the four-month period up 10.8% compared with 1983. Coated paper output paced this rise—production in the period was 16.7% above the 1983 level. Tissue paper grades were up 4.1% with a production of 4.9 million tons, a record high, and containerboard output showed a 13% gain. Corrugated shipping containers jumped 10.6% for the period, and April's shipments of fiber boxes was the highest April total on record, reported the Fibre Box Assn.

Canadian newsprint shipments slid 1.3% in April compared with the same month last year, but were up 4.8% in January-April over the same 1983 period, according to the Canadian Pulp & Paper Assn. April's operating rates were at 89%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	April	465	16.3	5,564	8.5
Uncoated groundwood (s)	April	127	0.0	1,592	10.4
Coated paper (s)	April	507	17.6	6,172	16.7
Uncoated free sheet (s)	April	744	0.8	9,281	7.5
Unbleached kraft packaging and industrial (s)	April	334	15.2	3,990	6.9
Tissue	April	405	5.2	4,898	4.1
Total paper	**April**	**2,875**	**9.1**	**34,995**	**9.3**
Kraft linerboard, unbleached	April	1,332	8.0	15,910	9.8
Semichemical medium	April	427	10.9	1,168	7.8
Bleached paperboard	April	348	5.4	4,101	5.0
Recycled paperboard	April	687	20.7	8,229	14.4
Total paperboard	**April**	**2,888**	**10.8**	**34,564**	**10.8**
Total paper and paperboard[5]	**April**	**5,763**	**9.9**	**69,560**	**10.0**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	March	4,858	6.3	55,642	8.3
Market pulp production	March	592	2.6	6,779	10.0
Wastepaper consumption at paper/board mills	March	1,389	11.0	15,830	10.7
Pulpwood consumption (cords)	March	14,480	113.9	57,920	5.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	April	21,960	7.5	89,663[6]	10.6
Containerboard inventories at box plants	Apr. 1	2,448	−0.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	March	860	16.8	10,395	28.1
Imports of Canadian newsprint	March	239	−6.1	7,374[6]	16.3
U.S. paper exports (including products)	March	402	15.5	4,295	−0.5
Exports of unbleached kraft linerboard	April	169	8.2	1,995	−11.5
Exports of woodpulp	March	373	12.3	3,801	13.6
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	April	701	−1.3	2,719[6]	4.8
Operating rates	April	89%	82%	85%	82%
Inventories held by U.S. consumers	Apr. 30	1,189	−3.3		
Woodpulp shipments (export only)	April	433	−11.6	1,920[6]	−6.3
Operating rates	April	80%	74%	73%	81%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Recycled paperboard: Clay-coated demand lags; housing helps uncoated

Statistics:	1982	1983	1984e
Production, 000 tons[1]	6,476	7,234	7,925
Capacity, 000 tons[1]	8,690	8,845	8,937
Utilization rate, %	74.5	81.8	88.7
Imports, 000 tons	32	50	75
Exports, 000 tons	158	150	132
Apparent U.S. consumption			
000 tons	6,350	7,134	7,868
lb/capita	54.4	60.8	66.7
000 tons/$ billion real GNP (1972)	4.27	4.65	4.89

1. American Paper Institute data.

GRADE STRUCTURE: Recycled paperboard is usually made almost entirely of wastepaper. It is divided into three categories: folding boxboard, setup boxboard, and paperboard. It can be produced on both fourdrinier and multi-ply paper machines. Folding boxboard is clay-coated, while setup boxboard is uncoated. Recycled paperboard includes corrugating medium, linerboard, gypsum linerboard, core, can and tube stock, but excludes construction papers or board.

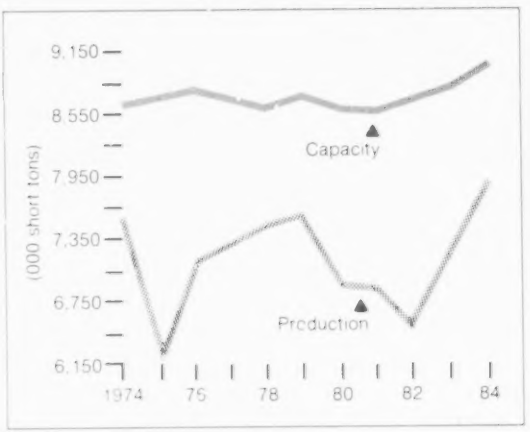
PRODUCTION/CAPACITY: Production rose 11.7% to 7.23 million short tons in 1983 from 6.48 million short tons in 1982. The recycled paperboard market should show substantial improvement in 1984, with production for the first quarter up 15.1% from a year ago. Among major markets for recycled paperboard, folding boxboard was up 11%; setup boxboard, 13%; tube, can and drum stock, 21%; gypsum wallboard facings, 52%; and panelboard up 47% from last year.

Slow capacity growth will help operating rates, with this industry expanding at just 1%/year over the next three years to 9.01 million tons in 1986. Improving market conditions, however, could cause some idle mills to reopen. One major expansion not included in the latest American Paper Institute capacity survey figures is Temple-Inland's new 175,000-tpy recycled linerboard mill in Ontario, Calif., set for startup in late 1985.

OUTLOOK: Continued strong demand for housing and autos, plus growing demand for consumer goods packaged in boxboard should keep recycled board consumption advancing. High operating rates for kraft linerboard and semichemical medium should keep recycled containerboard demand up.

Recycled paperboard production is expected to reach 7.92 million tons in 1984, 9.6% higher than last year, and operating rates should reach 88%, vs 82% in 1983. Prices for the lower grades such as chipboard and white-lined vat should be quite strong in the second half of 1984. Clay-coated prices should show substantial improvement by the year-end, reaching—and possibly exceeding—their 1981 levels.

PRICING: Clay-coated boxboard prices remained weak during the first half of 1984, although producers were able to pass on some of their increased wastepaper costs. Uncoated boxboard prices showed greater strength. Recycled boxboard prices should show substantial improvement through the second half of 1984, possibly exceeding 1981 peak levels. Prices below may reflect postdiscount transaction levels.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. Container Corp. of America	781	8.7
2. Sonoco Products	600	6.7
3. Jefferson Smurfit[1]	534	5.9
4. National Gypsum	417	4.7
5. U.S. Gypsum	377	4.2
6. Caraustar Industries[2]	325	3.6
7. Newark Group	325	3.6
8. Federal Paper Board	300	3.4
9. Rock-Tenn	255	2.8
10. Whippany Paper Board[3]	168	1.9
11. Republic Gypsum[4]	125	1.4
12. Packaging Corp. of America[5]	104	1.2

U.S. capacity (1984): 8.937 million tons
Capacity share of top five companies: 23.0%
Capacity share of top ten companies: 45.7%

1. Includes Alton Packaging Corp. and Smurfit Packaging Corp.
2. Holding company with ownership in Austell Box Board, Sweetwater Paper Board, Carolina Paper Board, and Carotell Paper Board.
3. Capacity figure represents tonnage at Clifton and Whippany (Hanover), N.J., mills, which have been closed since Whippany declared bankruptcy in 1980.
4. Bought Packaging Corp. of America's Hutchinson, Kans., and Denver, Colo., chipboard mills in November, 1983.
5. Sold three recycled paperboard mills equaling 214,000 tons of capacity and shut down a 49,000-tpy clay-coated recycled board machine in 1983.

Clay-coated 20-pt folding boxboard (rolls), $/short ton (year-end): 1975, $257; 1976, $262; 1977, $284; 1978, $305; 1979, $355; 1980, $380/400; 1981, $400/425; 1982, $380/425; 1983, $370/425; May 1984, $370/425. Bending 20-pt chipboard (rolls), $/short ton (year-end): 1975, $204; 1976, $212; 1977, $219; 1978, $225; 1979, $260; 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; May 1984, $370/425.

MARKETS: Market demand for recycled paperboard grades as measured by their capacity share is: folding boxboard, 30.4%; setup boxboard, 3.7%; corrugating medium, 17.7%; gypsum linerboard, 13.7%; linerboard, 5.1%; container chipboard and filler board, 2.9%; other paperboard 26.3%.

(News section continues on page 23)

FINANCE

Canada has mixed first-quarter results

Results in the Canadian forest products industry were sharply divided along geographic lines in the first quarter, according to a *Pulp & Paper* survey of 14 companies. Western financial reports were hit hard by the labor dispute in British Columbia that shut down the industry for ten weeks, resulting in the loss of some 700,000 metric tons of pulp production (*P&P*, May 1984, p. 27). Eastern pulp and paper companies, on the other hand, continued their steady climb out of the last recession, reporting earnings up seven-fold from severely depressed year-earlier levels on sales up 22.8% from last year. Earnings for the 11 pulp and paper companies surveyed totaled C$26.7 million, compared with a loss of $44.7 million last year.

In eastern Canada, strong sales gains and price increases for pulp and fine papers were behind the improved results, and most CEO's expressed optimism for continued gains throughout 1984. Domtar Inc. posted first-quarter income of $23.9 million, a 30-fold increase from the $700,000 reported in the 1983 quarter. Sales also improved dramatically, rising 24.1% year-to-year. Abitibi-Price Inc.'s profit for the quarter totaled $10.3 million, a gain of 412% over 1983. The company credited increased sales of all products and a more favorable U.S. exchange rate and said that newsprint operating rates were near capacity late in the quarter.

Consolidated-Bathurst Inc. announced first-quarter net income of $16.9 million, an 85.7% improvement over the 1983 quarter. Chairman and CEO William Turner Jr. said he expected continued improvements in packaging and particularly forest products. Fraser Inc.'s net income of $4.0 million was up 92.9% compared to 1983, while sales jumped 34.6% compared to last year. After five quarters of red ink, Great Lakes Forest Products Ltd. reported a modest profit for the quarter of $206,000, compared with a loss of $7.7 million in the year-ago quarter. Sales were up 30.6%, GLFP said, with shipments up in all categories.

Red ink in the West. With its pulp and paper mills down for over nine weeks and most of its forest products plants down for four weeks due to the labor strife in British Columbia, MacMillan Bloedel Ltd. posted a loss of $17.5 million for the quarter, compared with a loss of $23.0 million a year earlier. First-quarter sales were down 6.8%. But president Ray Smith remained optimistic about the outlook for the year, forecasting a 20% increase in lumber sales and stronger markets for newsprint, pulp and containerboard.

Canfor Corp. lost $10.5 million in the first quarter, compared with a loss of $15.7 million last year, but sales rose 5.3% from 1983. The shutdown prevented a "modest profit," the company said. British Columbia Forest Products Ltd. posted a first-quarter loss of $10.7 million, with sales down 12.2% from 1983. The company lost $16.1 million in the first quarter of 1983. BC Resources Investment Corp.'s Westar Timber Ltd. unit, formerly BC Timber Ltd., reported a loss of $6.3 million, the same amount as last year.

Scott Paper Ltd. posted first-quarter earnings of $2.6 million, up 1.7% from a strong performance in the 1983 quarter.

Among forest products companies, Doman Industries Ltd. reported a loss of $2.6 million for the first quarter, compared to a loss of $1.0 million last year. Sales, however, rose 30.9% compared to the 1983 quarter. Weldwood of Canada Ltd. lost $18,000 for the quarter, up from a $1.3-million loss last year, while Whonnock Industries Ltd. posted a loss of $1.3 million, compared with a $2.0-million loss in the 1983 quarter.

TABLE 1. **Canadian paper industry results.**

	First quarter (C$000)			
Paper companies	**Sales**	**Change 1984/83**	**Earnings[1]**	**Change 1984/83**
Abitibi	C$470,800[2]	21.6%	C$10,345[2]	411.6%
B.C. Forest	171,200	−12.2	(10,700)	n.m.
Canfor	226,400	5.3	(10,500)	n.m.
Con-Bathurst	394,000	15.2	16,900	85.7
Domtar	509,000[2]	24.1	23,900	3314.2
Donohue	104,300	25.8	5,300	n.m.[3]
Fraser	130,558	34.6	4,048[2]	92.9
Great Lakes	137,100	30.6	206	n.m.[3]
MacMillan Bloedel	411,900	−6.8	(17,500)	n.m.
Rolland	68,100	30.2	2,102	24.9
Scott	61,342	3.1	2,586	1.7
Total	**2,684,700**	**12.4**	**26,687**	**n.m.[3]**
Forest products				
Doman	56,400	30.9	(2,647)	n.m.
Weldwood	150,000	8.7	(18)	n.m.
Whonnock	62,423	12.4	(1,259)	n.m.
Total	**268,823**	**13.6**	**(3,924)**	**n.m.**
Canadian total	**2,953,523**	**12.5**	**22,763**	**n.m.**

( ) = loss. n.m. = not meaningful.
1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years. 2. 1983 results restated by company. 3. Not meaningful due to loss in 1983 quarter.

EXPANSIONS

Consolidated gets first twin wire

Consolidated Papers Inc. plans to rebuild No. 12 machine at its Wisconsin Rapids Div. The $15.6-million project would add 25,000 tpy of coated paper capacity.

At the wet end, No. 12 will have a rebuilt Beloit headbox and a new fourdrinier with the first twin-wire former for Consolidated. The Beloit Bel-Bond top wire is expected to improve sheet formation and reduce two-sideness. The machine will be widened 3 in. to a trim width of 125 in.

The press section will be rebuilt and 35 Voith 72-in.-dia dryers will provide needed additional drying capacity due to the machine's speedup from 800 fpm to a possible 1,800 fpm. A new GE drive will provide the increased speed. A 75% productivity increase is expected to result from the rebuild.

No. 12 machine will be shut down in early January 1985, and is scheduled to come back online on Mar. 21. After the rebuild the range of grades made by No. 12 will be expanded from the present 60- to 100-lb enamel printing papers to up to 183-lb basis weight to include cover grades and Consolidated's new Reflections (the company's newest No. 1 premium grade, made possible by the new off-machine coater installed at the Rapids Div. in 1983).

Pacific Rim the hottest growth area;

High growth rates forecast for Pacific Rim nations in this decade to benefit North American mills as the European market undergoes transition

By DAVID R. ALLAN, Associate Editor

■ Europe's nonintegrated paper mills face a shakeout in the next few years if their financially hard-pressed governments withhold monetary support. While this will eventually lead to a leaner, tougher European industry, it will also create potential investment and export opportunities for North American paper companies.

These conclusions, among others, were presented to delegates of a recent executive seminar on "Export and Overseas Investment Opportunities in Pulp and Paper," held at N.Y.'s Waldorf-Astoria Hotel. Papers were delivered by the consultants of London-based BIS Marketing Research Ltd.; the meeting was cosponsored by *Pulp & Paper* and *Pulp & Paper International*.

Such a shakeout will not necessarily mean a reduction in pulp consumption since the surviving European industry will still be making the same amount of paper. It may create new investment opportunities in small- and medium-size European companies looking for help staying afloat. Such companies—like many other European paper producers—will also be seeking closer links with pulpmakers in order to guarantee sources of supply. In some cases, however, this may reduce their reliance on market pulp.

All of the BIS speakers stressed the urgent need for North American mills to be reliable long-term suppliers in the market—which in many cases requires establishing local distribution networks and warehouses.

Another way of setting up a European distribution system would be to invest in merchant houses on the Continent and in the U.K. This could prove especially attractive for North American companies that find the number of European mills open to outside investment or purchase to be limited.

EUROPEAN MARKET. U.S. mills are already well-established as suppliers of paperboard to the European market, having about a third of the market in kraft linerboard, according to BIS's Jim Clancy. On the other hand, Clancy told delegates that share is down from almost 40% in 1975 and is unlikely to change much in the coming years because of slow U.S. capacity increases, strong domestic demand and the relative attractiveness of the Asian market.

BIS does see opportunities for U.S. mills in the area of virgin fiber-based folding boxboards and liquid packaging boards, with "an awareness of European servicing requirements necessary" in the former case and above-average demand growth seen in the latter.

As for paper, BIS's Richard Harris sees slow growth between 1982 and 1987 in European demand for major printing/writing grades, ranging from the 1%/year growth rate forecast for publishing grades and the 0.5%/year rate for "advertising and general print" end uses to the 2%/year rate for business papers. However, nonimpact printing in Europe is growing rapidly, and Harris expects to see paper use for high-speed laser printers triple in volume in the coming years.

The printing/writing areas Harris sees as most attractive for North American exporters include specialty uncoated free-sheet and coated free-sheet papers such as embossed cover and text papers and special coated papers for computer printers. Investment opportunities for North American companies include joint ventures or financial investment in medium-size specialty producers, in independent merchant houses in the U.K. and Fed. Rep. of Germany, and to a certain extent in a few large European paper companies.

SOUTHERN PINE PULPS. The North American pulp industry's prospects in Europe are still exciting, especially for southern pine pulp. BIS's Richard Cockram sees an extra 500,000 tpy of pulp of all kinds being needed by 1987, all of it to be imported. He noted, however, that Europe is turning increasingly to new suppliers in eastern Europe, Chile, Argentina and Morocco.

TABLE 1: **European printing/writing paper demand (000 metric tons).**

Sector	1982	1987e	Average growth rate (%/year)
Publishing papers	4,715	4,915	1
Advertising & general	3,335	3,410	0.5
Business papers	2,875	3,170	2
Other	575	605	1
Total	11,500	12,100	1

e = estimated.
Source: BIS Marketing Research Ltd.

Europe "mature"

The net increase in pulp consumption between 1982 and 1987 should be evenly split between bleached softwood and bleached hardwood kraft, with sulfite consumption in western Europe actually dropping by 100,000 tons.

Cockram estimates that 500,000 metric tons of southern U.S. pine were used in the European Economic Community in 1982. He believes that figure could rise to between 600,000 and 700,000 tons in 1987—or even as much as 900,000 tons if southern pine is in oversupply, as it was in the last three years, and if a correspondingly wide price differential with northern softwood opens up.

Export opportunities for Canadian pulp are not as good, with demand for northern kraft likely to remain "static at best." Cockram believes Canadian companies should look at integration possibilities.

THE PACIFIC RIM. The one overseas market that looks exciting in all areas is Southeast Asia and Oceania, with the economies of those areas expected by BIS's Gary Tilsley to grow at some of the fastest rates in the world for the balance of this decade. He predicted demand for newsprint, linerboard, printing/writing papers and pulp should grow at least 5% to 10%/year for the rest of the 1980s.

Southeast Asia and Oceania already import 315,000 metric tpy of linerboard, 420,000 tpy of printing/writing papers and 600,000 tpy of newsprint. North American companies are major suppliers in most of those areas.

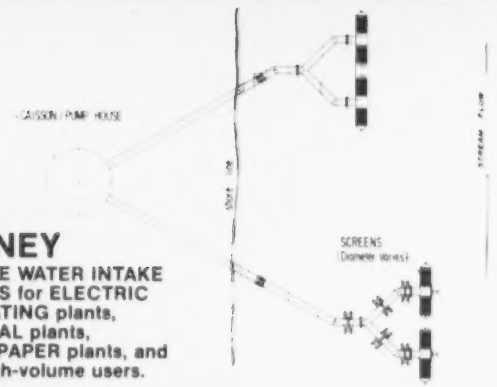
In contrast, investment opportunities in that region are less attractive since most capital spending is likely to focus on rebuilds of existing small machines or installation of secondhand units. Pulp produced in these areas is frequently nonwoodpulp or wastepaper. This kind of operation won't interest most North American investors, Tilsley noted. ■

TABLE 2: **European demand for southern U.S. pine pulp (000 metric tons).**

	1978	1982	1987e
Total softwood bleached kraft pulp	4,000	4,100	4,400
Southern U.S. pine	200	500	600-900
Proportion of southern U.S. pine to total (%)	5	12	14-20

e = estimated.
Source: BIS Marketing Research Ltd.

RANNEY METHOD
delivers LOW COST WATER by TWO proven methods



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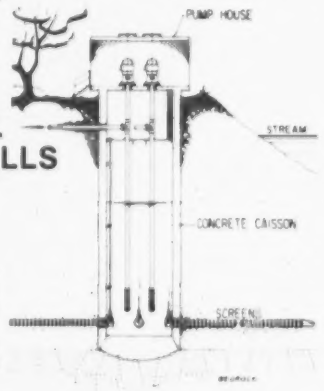

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Corrugated shipments seen rising 7% in 1984—record first quarter

But rising shipments may squeeze containerboard supplies, Fibre Box Assn. told; converters also face new quality demands from customers

By WILLARD E. MIES, Executive News Editor

■ Coming off a record 11.7% surge in first-quarter shipments, the corrugated box industry had reason to celebrate at the Fibre Box Assn. Apr. 30-May 2 annual meeting in Itasca, Ill. The meeting itself—the first large gathering to be held by the association in several years—was in a way a testimony to the industry's improving fortunes after a grim three-year span. Only last year did volume finally managed to peak above its 1979 level.

But members attending the meeting at the Hamilton Hotel were given few reasons for complacency. While corrugated box shipments may rise about 7% this year and a smaller amount in 1985, the increased demand will make containerboard supplies relatively tight, some speakers suggested. And even if they can get their raw materials, box makers will face changing customer requirements, new technology, competitive threats, and consumer legislation—forces which promise to transform industry.

BOARD SUPPLY SQUEEZE? U.S. corrugated box shipments should grow by close to 7% in 1984, hitting about 271 billion ft², with every quarter exceeding this year's record first quarter, according to Roger W. Stone, chairman and CEO of Stone Container Corp.

Stone predicted that real economic growth would increase at a 3.5%/year rate in 1985 and average 3% from 1986 through 1990. The current sense of fiscal responsibility in Washington will mean sustained economic growth, relatively moderate inflation rates, and a downward trend in interest rates through the remainder of the decade, he said.

Stone also predicted that by 1990 about 75 billion ft² more containerboard will be consumed in this country, equaling about 5.2 million tons of additional domestic containerboard consumption. The linerboard industry will also be pressed to increase exports because of continued growth in the world economy.

These numbers should be "thought provoking" to corrugated box producers since "it is very difficult to see any dramatic expansion at the mill level," Stone said. Expansion in recent years has been limited by an "almost nonexistent return on investment . . . coupled with an explosion in the cost of capital assets."

He noted that American Paper Institute capacity figures show that the industry added linerboard at an annual rate of 6.6%/year from 1960 to 1969, at a rate of 2.5% from 1970 to 1980, and at less than a 1%/year rate for 1981 to 1985. For the 1983 to 1986 period, containerboard capacity will rise 1.2%/year, but that includes a new mill, which may never be constructed.

Stone said that U.S. operating rates for linerboard should be pushing 100% at least through the end of 1986 and may be even higher. To bring operating rates down to around 90%, in excess of 2.6 million tons of capacity would have to be added at a cost of $3 billion and would not be ready to come online before the middle of 1987.

"No right-thinking businessman would spend that money unless he believed the price for linerboard in 1986 would achieve $500 to $550/ton and have a probability of remaining at that level for some protracted period of time," according to Stone.

The poor risk/reward ratio for new mill investment is one of the factors behind the increasing number of mergers and takeover attempts in the unbleached kraft industry. "Companies will increasingly be interested in buying facilities at a fraction of their replacement value. It is still far cheaper to buy good capacity in place than it is to build it."

Stone said it was hard to understand the opposition to the proposed changes in Rule 41 since these would better relate container specifications to actual performance and would also tend to increase the supply of linerboard. "It is my belief that one way or another, Rule 41 will change to respond to the needs of the marketplace rather than the needs of some producers."

CHANGING INDUSTRY STRUCTURE. The structure of the corrugated industry will change dramatically over the next ten years, Stone predicted. "Large-scale, highly productive billion-plus-square-feet container plants will be the orders of the day." This will be accomplished through the establishment of new plants with equipment such as computer-controlled continuous corruga-

tors costing as much as $15 to $20 million and also through the lower-cost approach of modernizing existing conventional equipment.

There will be a significant reduction in conventional sheet plants, although some specialty corrugators and specialty sheet plants will continue to thrive and be highly profitable.

Stone predicted that independent corrugators will face difficulty because of the squeeze in raw material supplies. "In an industry which is 80% integrated, it is logical to assume that growth tonnage will more and more be allocated to an individual company's own consumption and the protection of its own market share."

Further encouraging this trend is the fact that centralized purchasing of corrugated containers is growing at an increasing rate. "Increasingly, orders will come from corporate buying offices."

NEW QUALITY REQUIREMENTS. Stone noted the following trends in product development and changing quality requirements:

- Better techniques to provide quality graphics on corrugated board, such as preprinted linerboard or labeling, will become increasingly important. The solution to much of this market need will be multicolor, roll-to-roll printing. Because of the high capital cost that is involved, such equipment may be located at the millsite so that printed rolls can be shipped to many plant locations. Rengo does this in Japan.

Point-of-purchase graphics on corrugated containers will become much more important, particularly in toys, housewares, and even in consumables such as beverages and snack foods. "This direction will not only encourage the development of new printing processes but will probably demand the coloring of kraft surfaces as part of its evolution."

- In addition, there will be more E flute as corrugators expand into the traditional folding carton market. "The continuing trend in retailing toward giant, self-service stores would certainly lead to this conclusion."
- Related to possible changes in transportation rules, more emphasis will be placed on special board combinations providing exceptional strength for stacking in either dry or wet conditions. Products like Stone Container's Super Stone Cor, International Paper's Anvil Board, and Owens-Illinois' Ultra-Stack, will be increasingly in demand. Board treated with chemical resins at the paper mills and in the box plants has great potential for economical strength retention in high humidity or water exposure conditions.
- In new structure, there may be more automatic bottoms, outfolds, and two- and three-piece containers.
- Growth in the use of packaging systems will mean more precision and sophistication in the production of corrugated boxes and increasing importance of quality and zero defects. Service requirements will increase as customers emphasize smaller inventories and shorter lead times. To respond to these needs, Stone Container about four years ago began a program called "IQS" for innovation, quality and service.

ECONOMIC OUTLOOK. The U.S. economic recovery is about halfway through its life cycle by historic standards, with expectations growing that the economy may peak in 1985 and then weaken. But there are some encouraging signs that suggest the typical pattern may not be repeated, according to Norma Pace, senior vice president of American Paper Institute.

TABLE 1: **Forecast of U.S. business activity (% change over year-ago levels).**

	1982	1983	1984e	1985e
Real GNP	1.9%	3.4%	5.4%	2.1%
Industrial production	8.2	6.6	10.3	3.2
Consumer prices	6.0	3.3	5.4	6.5
GNP deflator	6.0	4.3	5.1	5.7
Real consumer goods expenditures	0.1	5.5	5.8	0.3
Retail sales	2.7	9.1	10.5	5.3

e = estimated.

Although there is concern that rising operating rates will touch off a classical demand/pull type of inflation, the facts are that most post World War II inflation can be traced to cost/push, particularly in labor costs, she noted. Wage hikes are likely to continue to be moderate because of increased imports, reduced exports, and deregulation of heavily unionized transportation industries.

"The present rise in interest rates results from an escalation in private credit need since mid-1983 and a tightening in the banks' lending capacity in the second half of 1983, which resulted from the policies of the Federal Reserve." The upward pressure on interest rates will persist for another few months, and then short-term rates should begin to descend by year-end, Pace said.

Consumer confidence has been high, and retail sales will probably rise 10.5% this year following a 9.1% advance in 1983. Industrial production is forecast to increase 10.3% this year and 3.2% next year. "The output of consumer goods will moderate during 1984 and 1985, while the production of capital goods is expected to move ahead at a fast clip through 1985."

Pace forecasted that corrugated box shipments would advance 7.0% in 1984 to about 270 billion ft² and then rise 3.5% to 280 billion ft² in 1985. The forecast assumes that box demand will grow slightly faster than industrial production in customer industries (weighted by box use), which should rise 7.4% in 1984 and 2.4% in 1985.

This would begin to reverse a gradual erosion that has taken place in the relationship between output of customer inventories and corrugated box shipments. "In 1982, box demand, despite its sharp advance, remained 8% below the pre-1975 relationship between industrial production and box usage," Pace said. Reasons for this gradual market erosion include better customer cost management, new distribution systems and new packaging techniques and materials.

Pace forecasted unbleached kraft paperboard production would rise 5.7% in 1984 to 17.2 million tons and 2.3% in 1985 to 17.6 million tons. Based on revised figures recently compiled by API, capacity is forecast to rise 1.1% to 17.9 million tons in 1984 and 1.5% to 18.1 million tons in 1985. "The production requirements are quite close to practical capacity figures for both 1984 and 1985, Paced noted.

NEW MARKET OPPORTUNITIES. The shift to plastics from glass and cans may have significant market implications for the corrugated container industry, according to William Laimbeer, president of the Diversified Div. of Owens-Illinois Inc.

"The glass or metal-packed product stacked eight

TABLE 2: **U.S. fiber box shipments vs production in customer industries (% change over year-ago levels).**

	1983	1984e	1985e
Production in customer industries*	6.0%	7.4%	2.4%
Box shipments	7.4	7.0	3.5

*Represents a weighted composite of 54 industries that use boxes.
Source: American Paper Institute, Economics Dept.
e=estimated.

TABLE 3: **U.S. unbleached kraft paperboard production and capacity forecast (000 short tons).**

	1983	1984e	1985e
Production	16,250	17,180	17,581
Exports	2,163	2,250	2,450
Capacity	17,690	17,877	18,142
Operating rate (indicated) *	91.8%	96.1%	96.9%

*Calculated by *Pulp & Paper.*
e=estimated.

cases high on a pallet ten years ago needed very little vertical support from its corrugated container," he noted. "But consider the same product—a juice drink, for example—packed today in plastic or a flexible foil laminate. The demand on corrugated escalates with such a primary package," the O-I executive said.

"A box simply has to have greater stacking strength if it is to successfully carry a semirigid or flexible package to the point of purchase." Another reason for this is the concern that customers have to improve the efficiency of their warehousing and shipping systems. "With rising energy costs, getting more on a truck and stacking it higher in a warehouse has taken on greater importance because larger payloads mean better fuel utilization and higher stacking cuts the need for new floor space."

The shift to plastics in primary packaging may mean greater use of corrugated board and less use of shrink film and trays. And the Rule 41 implication is that lighterweight linerboard may not be as inevitable as it seems, Laimbeer said.

Performance characteristics should be developed for linerboard and medium that are "very different from the antiquated specs covered by Rule 41," Laimbeer said. The industry needs specs based on ring crush, tensile strength, tear and scuff resistance—not just weight.

He cited the rollstock moisture content standard developed by the now disbanded Corrugated Industry Development Corp. CID showed that the key cause of warp in corrugated board is moisture variation between top and bottom liners or across either top or bottom liner. "Any mill supplying a box plant should be able to conform to it, or at least measure up to some standard to ensure that the liners they ship you will be consistent in moisture content from roll to roll and within each roll," Laimbeer said.

A major change taking place in the corrugated box industry is the growing role of marketing. "We as an industry are moving—like it or not—from a technology- or cost- or efficiency-driven industry to a market-driven industry," Laimbeer said. "Technology, cost and efficiency are still important parts of the equation, but the main force now comes from outside the box plant or mill—the customer is now driving our industry."

RULE 41—STILL ALIVE. Fibre Box Assn. and API's Fourdrinier Kraft Board Group plan to advance a "revised" alternate proposal to Rule 41 carrier standards for corrugated containers, according to FBA executive director Tom Muldoon.

An industry proposal was rejected last year by the railroad classification committee after it ran into opposition from some containerboard producers. This time the revised proposal will probably be submitted first to the trucking industry classification committee and then advanced to the railroads, Muldoon said.

The main changes in the revised proposal were to make the method of running the bursting test the same as in the current rule and in the withdrawal of an alternate triple-wall standard. Thus, the test will still require that five or six bursts be above the specified level—rather than an average of ten tests required in the earlier proposed alternate.

The revised alternate rule will still use edge crush—which relates to compression strength—as the single most important criteria for corrugated containers. And bursting strength would still be reduced by 20% from the current 200-lb test level. But there would be no change in the weight of facings (linerboard) in the alternate, which would be in effect for a three-year trial period along with the existing rule, Muldoon explained.

Muldoon also outlined work the industry has been doing with the U.S. Dept. of Agriculture regarding the packaging of meat and poultry. The USDA's requirements have become increasingly strict in recent years even though another government agency, the Food & Drug Administration, also regulates food packaging.

Supported by the Reagan Administration's philosophy of reducing excessive government regulation, FBA, API and the Paperboard Packaging Council have been trying to convince the Dept. of Agriculture to acept the judgement of the FDA. The USDA agreed and has issued a new "simple procedure" that will become effective July 17.

Under this new rule meat and poultry packing plants would become responsible for securing guarantees from their suppliers that the packing materials comply with federal food laws and regulations. In addition, the meat inspectors will monitor these guarantees on a random basis. Previously, packaging producers had to obtain a letter of acceptance from the USDA in an increasingly elaborate and time-consuming procedure.

"All of this sounds very good," Muldoon said. "The problem arises, however, when we examine the information the USDA says should be included in each guarantee." This would include letters from suppliers stating that their materials (linerboard, adhesive, etc.) are in compliance with food and drug laws. FBA and other industry groups, however, are working with USDA to simplify the requirements.

RISING PRODUCTIVITY. U.S. shipments of corrugated and solid fiber products in March were 23.65 billion ft^2, 8.4% above a year earlier and the highest month for shipments in the history of the industry, according to Henry J. Daluga, FBA statistical director.

Shipments for the entire first quarter of 1984 were up 11.7% from the first quarter of 1983 and also set a quarterly record.

Last year corrugated box shipments rose 7.4% to 252.539 billion ft^2 from 1982 and also topped their pre-

vious peak of 250.643 billion ft² reached in 1979.

All sections of the country shared in last year's shipment gains, with the Northeast (Area 1), up 4.7%; East (Area 2), up 11.1%; East Central (Area 3), up 8.6%; North Central (Area 4), up 8.4%; South Central (Area 5), up 6.8%; and West (Area 6), up 5.8%. The smaller gain in the Northeast reflected higher shipment levels in 1982 because of a Canadian industry strike, Daluga noted.

The FBA's corrugated price index for the first two quarters of 1982 stood at 229, then began a steady decline through the first quarter of 1983. The index then went up in the second quarter of 1983 before going back down in the third quarter. In the fourth quarter of 1983 the index registered a gain of almost 8 points, ending the year at 225. The index gained 2.2% in the first quarter of 1984 to 230 vs a 1.1% rise in the producer price index.

The average weight of corrugated board has been increasing and in 1983 averaged 138 lb/1,000 ft² compared with 136 in 1970. "This ties in with the fact that our growth in recent years has been in packaging of heavier products and that where we lost volume to competing materials has been in lighter grades," Daluga said.

The percentage of industry production consisting of double wall and triple wall bears out this change in basis weight, he noted. In 1983, 8.6% of industry output consisted of double and triple wall compared with 7.3% in 1970 and 5.4% in 1960. The pattern of end uses for corrugated boxes in 1983 did not show much change from prior years. Food and beverage industries are still far and away the largest users of corrugated boxes at 38.0%, followed by the paper industry at 12.9%, stone, clay and glass at 7.1%, and chemicals at 6.7%.

The total number of employees in the corrugated box industry did not change very much in 1983, rising 0.8% from 59,100 in 1982 to 59,600 in 1983. This resulted in a significant increase in productivity because of the large increase in box shipments. Employee hours per 1,000 ft² went from 0.50 hours in 1982 down to 0.47 hours in 1983, while labor costs only rose from $4.67/1,000 ft² in 1982 to $4.84, an increase of 3.6%.

The productivity improvement was due partly to heavy investment in new equipment—i.e., continuous-run corrugators, direct-drive knives, splicers, stackers—and more efficient downstream presses and die cutters.

ROLE OF THE INDEPENDENT. The new technology is leading to higher volume per plant and a drop in the total number of plants in the industry. The average converting plant in 1979 produced 402 million ft², while in 1983 it produced 430 million ft². The total number of plants dropped from 1,460 in 1979 (649 converters with corrugators and 811 sheet plants) to 1,370 plants in 1983 (614 converters and 756 sheet plants), said Daluga.

Not surprisingly, independent box makers said they would continue to play an important role in the industry in future years. Charles S. Wolf, president of York Container Co., cited statistics showing the number of independent box plants had risen from 117 in 1974 to 126 currently, while their share of total box shipments had increased from 21.9% in 1974 to 23.6%. He predicted that the independents' share of the market will grow to 25% in the years ahead. ■

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On Reader Service Card **Circle 179**

Matt Coleman *is engineering editor for* Pulp & Paper. *Comments should be addressed to him at:* Pulp & Paper, *2700 Cumberland Parkway, N.W., Suite 530, Atlanta, Ga. 30339.*

Survey examines the typical engineer

Engineers in the paper industry resent being stereotyped. They don't like the image of a somewhat eccentric, strangely dressed slide rule jockey, good at numbers but not necessarily the English language. Most take their jobs seriously and feel they play a vital role in keeping the industry progressive and efficient.

Typically, engineers see themselves as conservative individuals who are logical, analytical, practical, factual, creative, and oriented toward math and computers. They believe that engineers have a well-rounded education, understand the business side of the industry, work well with people, and have management potential. But nonengineering employees don't agree with many of these perceptions.

Basically, these are the results of an engineer profile survey which ran in the May 1984 Engineer to Engineer column (*P&P*, May 1984, page 159). The first part of the "quiz" was actually conceived as a tongue-in-cheek look at engineers, but several questions obviously touched on subjects of genuine concern to most respondents. Several hundred questionnaires were returned, and the high level of response is sincerely appreciated.

The first part of the survey was a true/false section dealing with various engineering characteristics. Figure 1 shows the typical response of both engineers and nonengineers.

(Continued on next page)

FIGURE 1: **Typical response from engineers and nonengineers.**

	Engineers		Nonengineers	
Engineers:	**True (%)**	**False (%)**	**True (%)**	**False (%)**
1. Are good at math	96	4	92	8
2. Like to work overtime	27	73	33	67
3. Wear a calculator on their belt	5	95	42	58
4. Understand machinery	92	8	92	8
5. Like computers	83	17	75	25
6. Are conservative	85	15	83	17
7. Are liberal	14	86	25	75
8. Are logical	96	4	75	25
9. Are concerned with detail	87	13	83	17
10. Always wear pocket protectors	17	83	58	42
11. Wear white socks	11	89	42	58
12. Wear plaid shirts and striped ties	6	94	42	58
13. Make the best managers	36	64	25	75
14. Make terrible managers	21	79	25	75
15. Took harder college classes than business majors	92	8	67	33
16. Have poor communication skills	29	71	67	33
17. Are analytical	97	3	83	17
18. Don't see the "big picture"	25	75	50	50
19. Are practical	90	10	75	25
20. Are picky	64	36	75	25
21. Don't understand the business side of the paper industry	28	72	67	33
22. Work on their own cars	62	38	67	33
23. Work with facts	98	2	83	17
24. Don't work well with people	12	88	50	50
25. Take chances	43	57	33	67
26. Are creative	82	18	42	58
27. Don't have a "rounded" education	25	75	58	42
28. Are condescending to nontechnical people	31	69	58	42
29. Play a vital role in keeping industry progressive and efficient	97	3	67	33

DIFFERING VIEWS. Engineers and nonengineers generally agreed on many of the characteristics, but not those in true/false Nos. 10, 16, 21, 24, 26, 27, and 28. This is interesting in that engineers seem to be unaware of some impressions they give to nonengineers. How these impressions are formed is beyond the scope of this survey, but responses to several questions possibly provide an indication.

For example, Question 28, concerning whether engineers are condescending to nontechnical people, drew a 69% false response from engineers, but 58% of the nonengineer employees felt it was true. Why nonengineers may feel this way, again, could not be explored in such a limited survey. But the fact that 92% of the engineers thought they took more difficult courses in college than business majors, for example (No. 15), could be typical of the engineering characteristic that nontechnical people consider "condescending," particularly if engineers overtly make a point of it. Interestingly, nonengineering personnel agreed with engineers on this question, but to a significantly lesser degree (only 67% marked true).

Engineering and nonengineering types may also have differing views on what is important to the successful operation of a business or industry—the knowledge and the training that comes with perhaps taking "harder" technical courses in college, or the more subjective, but critical, "arts" such as communications. Assuming that nonengineers consider good communication skills important in their business, 67% thought engineers were deficient in this regard (No. 16). Engineers (71%) disagreed.

The fact that nonengineers also disagreed overwhelmingly with engineers on the questions of well-rounded education (No. 27), understanding the business side of things (No. 21), being creative (No. 26), and working well with people (No. 24), further indicates that engineers may not be fully attuned to impressions they make on their nontechnical peers.

Most respondents played it straight on questions relating to personal eccentricities of engineers. However, reported observations by many people, including this editor, are that, at least around some engineering offices, pocket protectors, white socks with black shoes, and other forms of personal expression appear more often than is believed. Some respondents caught the lighter side of these questions, but a few were upset. However, nonengineers do notice those pocket protectors.

MIXED RESPONSES. Since many respondents (40%) were engineers in management roles, with another 20% to 28% being project engineers or in supervisory jobs where people skills are needed, the mixed responses on best/worst manager questions (Nos. 13, 14) were expected. Engineers don't make the best or the worst managers since like every other group they fall somewhere in between. Not surprisingly though, management training for improving people skills rated higher than learning computer skills in the continuing education section.

Results from the survey's second section, covering the position rankings for day-to-day mill operations, are shown in Figure 2. The mill manager and the fiduciary set don't do well in anyone's eyes as far as day-to-day operations are concerned. Both group's views were very close.

Figure 3 shows the interest levels of engineers for additional education (section three of the survey). Continuing education that can be of immediate benefit (computer training, management development) ranked the highest, with a surprisingly equal response for an M.S., liberal arts, crossover B.S., or accounting degree. The need for specialty programmers familiar with the papermaking processes is increasing in the paper industry, thus the software category received a high response. Most engineers are familiar with how difficult it is to get specialty software written for any sort of automated control system. Increasing use of small and portable computers in the mill makes computer programming for professionals an important skill.

Management training and an M.B.A. are perennial favorites for people trying to escape the "engineering ghetto," as this survey showed. The strong interest in additional education is interesting considering the respondents were 95% trained engineers. Some topics added to the list include flying, music, P.E. license, and psychology.

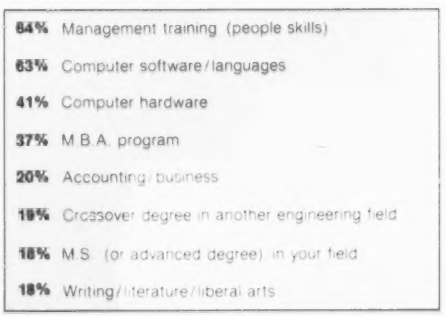
Additional comments and responses to this column or on any engineering topic are always welcome. Please send them to:
Matt Coleman, Engineering Editor, Pulp & Paper, 2700 Cumberland Parkway, Suite 530, Atlanta, Ga. 30339.

FIGURE 2: **Most important in day-to-day operations of a pulp and paper mill.**

(1 is most important; 6 is least important)

	Engineers	Nonengineers
1.	Operators	Operators
2.	Maintenance/ technicians	Superintendents
3.	Superintendents	Maintenance/ technicians
4.	Engineers	Engineers
5.	Mill manager	Mill manager
6.	Accountants/ financial	Accountants/ financial

FIGURE 3: **Subjects engineers would like additional education in.**


64% Management training (people skills)
63% Computer software/languages
41% Computer hardware
37% M.B.A. program
20% Accounting/business
18% Crossover degree in another engineering field
18% M.S. (or advanced degree) in your field
18% Writing/literature/liberal arts

Sodium hydrosulfite markets show modest recovery

By BARRY SHOCKETT

As predicted, the U.S. domestic market for merchant sodium hydrosulfite recovered somewhat in 1983 and should increase, about the same amount in 1984 (about 10%). Both imports and exports are also expected to rise this year—to 3,000 and 17,500 tons, respectively—up from 1,200 and 16,900 tons in 1983.

Canada continues to be dependent on imported sodium hydrosulfite for both merchant product and the Borol precursor for onsite production. Virchem Canada has built a new formulating facility in Jonquière, Que., replacing its Moncton, N.B., operation.

U.S. statistics, sodium hydrosulfite[1] (000 short tons)

	1981	1982	1983	1984e
Nameplate capacity	73.5	61	67	74
Production	71	60	66	70
Imports	0.3	3.2	1.2	3
Exports	15.6	17.7	16.9	17.5
Apparent consumption	55.7	45.5	50.3	55.5
Pulp and paper	16.7	16.7	17	17.5

1. Not including onsite production via Borol.
Sources: Bureau of Census, Dept. of Commerce; *Pulp & Paper* and industry estimates.

Canadian statistics, sodium hydrosulfite[1] (000 short tons)

	1981	1982	1983	1984e
Imports[2]	8.3	7.6	10.1	10.5
Total demand[3]	8.3	8.2	8.3	9.5
Pulp and paper	7.2	7.1	7.4	8.4

1. Not including onsite production via Borol. 2. No sodium hydrosulfite is produced commercially in Canada. 3. Not including inventory changes.

SODIUM HYDROSULFITE

UNITED STATES

Uses: Sodium hydrosulfite is used as a bleaching agent for mechanical and deinked pulps. The textile industry is the largest consumer. Other enduse applications of sodium hydrosulfite include kaolin clay bleaching and specialty chemicals.

Demand: Despite the growth in total domestic demand for merchant hydrosulfite in 1983, pulp and paper usage last year increased only 2% to an estimated 17,000 tons. (Mill usage had remained flat during 1981 and 1982.) Additionally, an estimated 8,800 tons (100% basis) of hydro were produced onsite by the mills via the Borol process. Pulp and paper's share of the merchant market dropped slightly in 1983 to 34% from the 36.5% accounted for in the previous year. Exports last year were at the 17,000-ton level, about 4% to 5% under the 1982 figure.

Sources: The remaining two sodium hydrosulfite producers in the U.S. are Olin (two plants) and Virginia Chemicals (three plants). Virginia Chemicals is completing major expansion programs this year at its Bucks, Ala., and Leeds, S.C., facilities. Morton-Thiokol's Ventron Div.is still the sole supplier of Borol solution to mills.

Availability: The capacity expansions by Virginia Chemicals will ensure adequate supplies for the foreseeable future. 1983, market; 1982, market; 1981, market; 1980, market; 1979, market; 1978, market.

Pricing: The 60¢/lb list price for merchant sodium hydrosulfite, originally posted on Dec. 1, 1981, has remained in effect throughout 1982 and 1983, as well as for the first half of 1984. Pricing history: 1983, proprietary blends, 60¢/lb, f.o.b. producing point; 1982, 60¢/lb; 1981, 55¢-60¢/lb; 1980, 43.5¢-55¢/lb.

Forecast: As the economy continues to recover, pulp and paper usage of merchant sodium hydrosulfite should increase modestly this year between 2% and 3%. Total merchant demand is expected to reach the 55,500-ton level, so the pulp and paper industry's share will drop to about 31.5%.

CANADA

Uses: Sodium hydrosulfite is used mainly by newsprint and groundwood-specialties mills to bleach mechanical pulps. The other minor enduse is for vat-dyeing of cotton.

Demand: In 1983, an estimated 7,400 tons of merchant sodium hydrosulfite (100% basis) were used by the pulp and paper industry out of a total demand of some 8,300 tons. On a 100% basis, about 17,400 tons of hydro were produced onsite by mills in 1983 via the Borol process.

Sources: Virchem Canada is the major supplier to pulp and paper mills with sodium hydrosulfite imported from its U.S. parent. Several distributors bring in hydro from offshore sources. Imports from Morton-Thiokol's Ventron Div. supply Canadian mills with Borol solution.

Availability: The Canadian market is relatively small, and thus no shortages are likely in the foreseeable future. 1983, market; 1982, market; 1981, market; 1980, market.

Pricing: Continued pricing adjustments for exchange purposes raised the price of blended sodium hydrosulfite to C72¢/lb (up a penny) on Apr. 1 of this year. The nonblended product was listing at the June 1, 1983 price of C68¢/lb. Pricing history: Blended: 1983, C69.4¢-71¢/lb; 1982, 64¢-69.4¢/lb; 1981, 59¢-64¢/lb; 1980, 51.4¢/lb; 1979, 50.5¢/lb. Non-blended: 1983, 61¢-68¢/lb; 1982, 61¢-71.5¢/lb; 1981, 66.4¢-71.5¢/lb; 1980, 56¢-66¢/lb; 1979, 47.5¢-56¢/lb.

Forecast: Both total demand and pulp and paper usage of merchant hydrosulfite are expected to increase in 1984. Mills should employ 8,400 tons (100%) out of a total consumption of about 9,500 tons. An additional 1,200 tons of Borol solution (12%) will be required by the mills this year, bringing 1984 consumption to 10,300 tons.

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